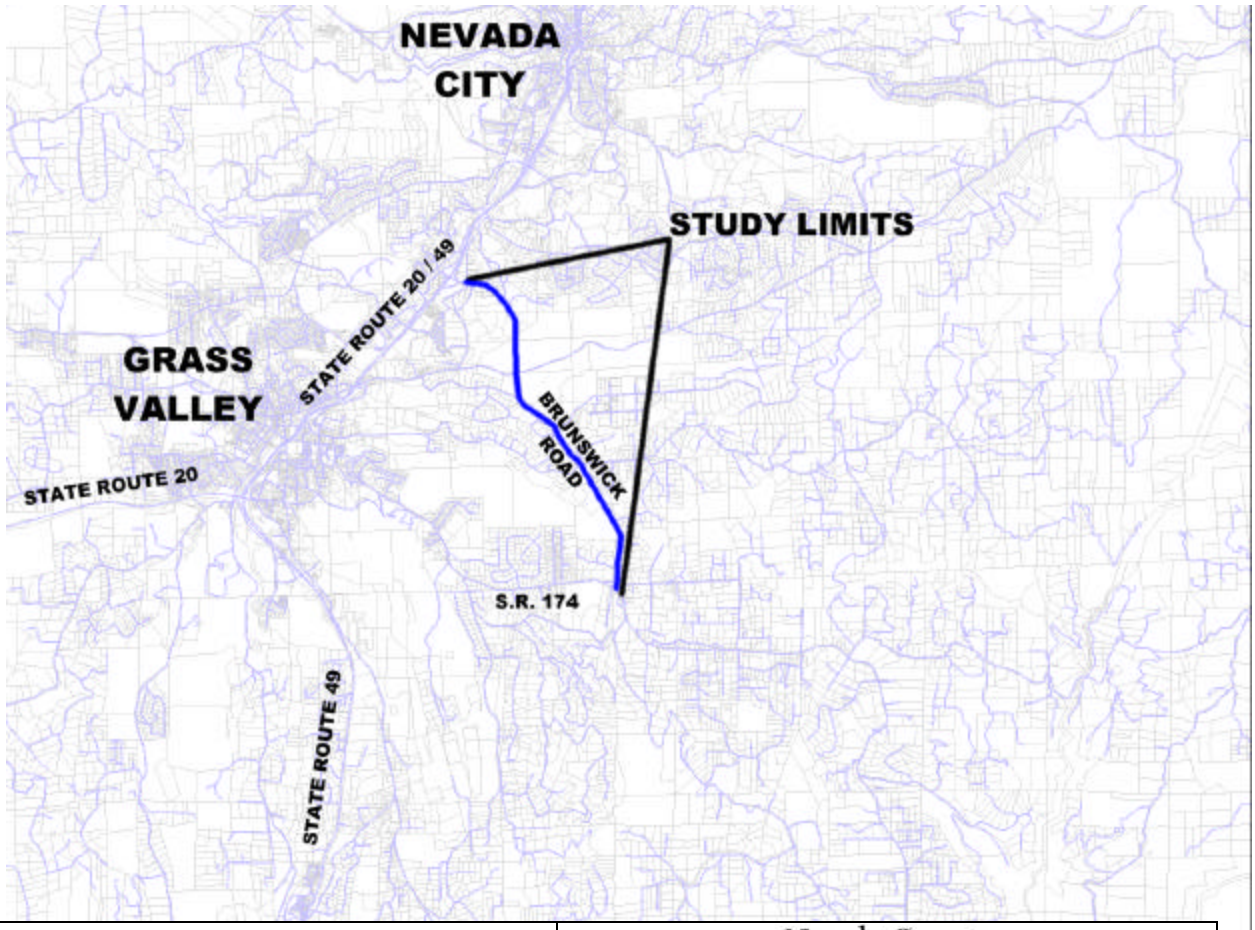
FINAL REPORT:
CORRIDOR STUDY FOR BRUNSWICK ROAD FROM SR 20 TO SR 174



Prepared for the Nevada County Transportation Commission

Nevada County Transportation Commission
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Executive Summary

LOS D or better conditions are possible at all locations along the Brunswick Corridor between Sutton Way on the north, and the SR 174 intersection on the south. Certain mitigations will need to be in place before the Year 2020, as the existing intersections and corridor configuration will fail with projected Year 2020 volumes.

Highlights of the Study Findings:

- The Dorsey Drive interchange installation will significantly improve traffic conditions to the Brunswick Basin area, and will reduce traffic volumes along the Brunswick corridor on the north side.
- The Dorsey Drive extension from Sutton Way, crossing Brunswick Road with a signalized intersection, and continuing to the Idaho Maryland corridor, will significantly aid circulation, and provide relief to critical areas along the Brunswick Corridor.
- Several cut-off roads in the Brunswick Basin vicinity were investigated and found to have some merit for local traffic circulation, but did not provide significant relief to the Brunswick Corridor, or did not eliminate the need for any of the several recommended improvements for the Brunswick Corridor.
- A new road (Loma Rica Bypass) connecting Idaho Maryland Road with the existing Loma Rica Business Park road, Loma Rica Drive, will help to significantly reduce traffic impacts from future development onto Brunswick Road in the vicinity of Loma Rica Drive and Idaho Maryland Road. This mitigation will require further study to determine specific alignments, geometric investigation, etc.
- A new road (Greenhorn Bypass) connecting Greenhorn Road with the Loma Rica Business Park on the south side will significantly relieve left turn traffic demand at the existing Loma Rica Drive / Brunswick intersection. This mitigation will require further study to determine specific alignments, geometric investigation, etc.
- Signals at all major intersections along the corridor mitigate LOS F conditions for stop sign control, at the following location: Old Tunnel, Dorsey Extension, Greenhorn Road, and SR 174.

The County's LOS analyses for all existing and future scenarios was useful in developing solutions that would achieve LOS D or better conditions along all roadways in the study area, and in particular, the Brunswick Corridor. The analysis results were used to determine how

best to develop conceptual plan line mitigations for new roadways. By understanding the capacity constraining problems, it was possible to conceive of what could mitigate the same. This report documents the detailed mitigations in the sections that follow, and provides graphical information to illustrate the various concepts.

Several capital improvements were needed to achieve LOS D or better conditions along the Brunswick Corridor in this study, and they are summarized in Table ES.1 below.

Table ES.1

Cost Total Summary

IMPROVEMENT LOCATION	Cost Estimate
• Sutton Way SB Left Turn Pocket	$250,000
• Dorsey Drive Extension and Signal	$934,000
• Idaho Maryland Cul-de-sac (two)	$250,000
• Whispering Pines TWLT Lane install	Cost of Paint
• Loma Rica Drive TWLT Lane install	Cost of Paint
• Loma Rica Bypass to Idaho Maryland	$1,800,000
• Loma Rica Bypass to Greenhorn Road	$640,000
• Brunswick and Greenhorn Road	$150,000
• Brunswick and SR 174	$150,000
Total Cost for Improvements:	**$4,174,000**

Source: PRISM Engineering and Caltrans Cost Factors

Introduction

The purpose of this study was to develop a specific corridor plan for Brunswick Road between the Brunswick Basin on the north and State Route 174 on the south. Currently the Brunswick corridor consists of a two-lane arterial roadway for the majority of the study section, with some treatments for left turn pockets at Greenhorn Road as well as Loma Rica Drive. Brunswick Road widens to a four lane arterial roadway in the vicinity of Sutton Way. Brunswick Road provides access to State Route 174 on its south end, the Loma Rica Industrial Park, the proposed Loma Rica Ranch development, and the Brunswick Basin which is already developed. As part of the 2000/01 Overall Work Program, the Nevada County Transportation Commission worked closely with the Nevada County Department of Transportation to develop this corridor plan for Brunswick Road between State Route 174 and the Brunswick Basin.

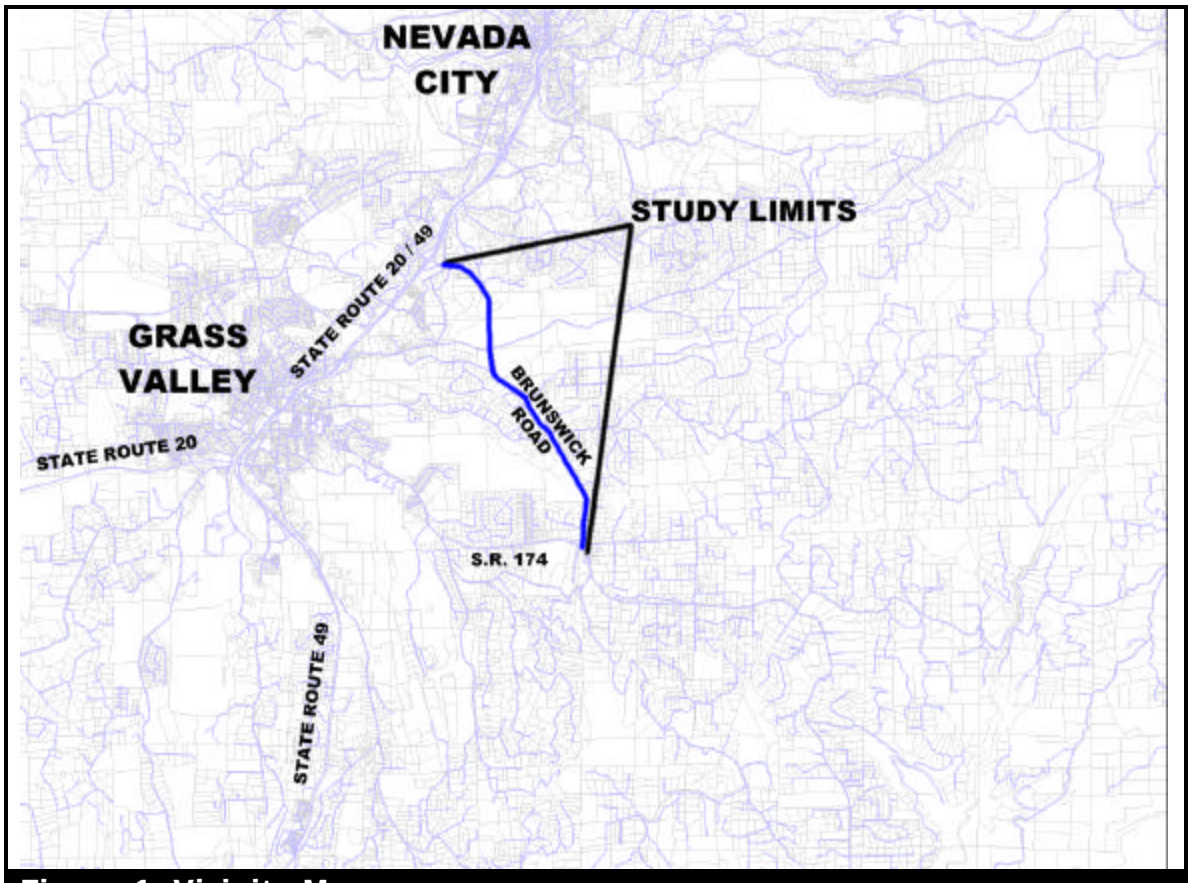

Figure 1 Vicinity Map

This project will prepare a specific corridor plan for Brunswick Road sensitive to potential traffic impacts from future buildout of the Nevada County General Plan as well as the City of Grass Valley General Plan. The corridor plan will identify future traffic improvements needed to mitigate future traffic impacts to an LOS D or better condition for the Year 2020 scenario. In this study several future scenarios with and without the Dorsey Drive interchange were analyzed by the County DOT staff to determine what kind of ultimate intersection and cross-section configuration would be needed by the Year 2020.

As a part of this work effort, it was necessary to analyze traffic conditions along the corridor for existing and 20 year projections, and to use this information to design the ultimate configuration needed for the corridor. It was necessary to design conceptual geometrics sufficient to develop preliminary cost estimates for all identified improvements.

Methodology

This study effort utilized AutoCAD software and data files provided by the City and County. Specifically, graphical data representing topography and road pavement locations, signing and striping, etc., were provided and contained in the CAD files. PRISM Engineering used this data as a base to develop improvement concepts and roadway alignments, and to develop cost estimates. The product of this corridor plan is the result of utilizing a traffic model data for the future conditions traffic projections, coupled with a level of service analyses provided by the County Department of Transportation. The final product consists of a conceptual plans for right-of-way and construction needs for the Brunswick corridor, existing and future pavement cross-section needs, and access configuration along the Brunswick corridor interfacing with various developments along the way. Specifically, the Brunswick Corridor conceptual plan includes details for interfacing Brunswick Road with Sutton Way, Dorsey Drive, Idaho Maryland Road, Loma Rica Business Park, Greenhorn Road, and S.R. 174, as well as other concepts studied in this report. Reference is made to Figure 2 for a graphical representation of the Brunswick Corridor and study intersection locations.

In this study several different forms of mitigation for the Brunswick corridor were investigated in order to achieve level of service D or better conditions. Safety was a consideration in all mitigations explored. It was also necessary to investigate the need for protected

left turn channelization, installation of traffic signals, realignment of side street access, closure of roadways and construction of new alternative roadways, etc. For naming conventions, Brunswick Road is considered a north/south corridor and all side streets interfacing with it are designated as east/west streets, even though literally in some cases they may be north/south (such as Sutton Way).

Project Description

The Brunswick corridor from SR 20/49 to SR 174 is a logical route for semi-regional traffic to and from the Grass Valley / Nevada City area. SR 174 connects to Colfax along the I-80 corridor, and represents a regional highway connecting the Interstate 80 corridor with the Urban Areas of Grass Valley and Nevada City. This corridor will likely play a much more important role in the future as the SR 49 corridor reaches capacity before it is widened to four lanes within Nevada County.

The Brunswick corridor has certain known capacity limitations, including grade issues which are aggravated in the winter weather conditions (such as at the Idaho Maryland intersection), and side street access complications. Other intersections along the corridor are either on a grade or a curve, and present certain challenges to driver safety and road capacity (such as sight distance, delays and gaps in traffic, etc.).

The MINUTP NCTC traffic model developed in the Empire Interchange and SR 20 Corridor Study (completed by end of June 2000) was utilized in this study, with some modifications made to land use data by the County along the Brunswick Corridor to better represent a conservative estimate of 20 year growth condition of the corridor area.

Traffic operations for existing and future conditions were analyzed by the County, and various alternative solutions were developed. The Highway Capacity Manual software, HCS was used for analysis, with some additional checking using the SynchroPro signalized analysis software.

Project Objectives

In this study several forms of mitigation for the corridor were investigated including:

- protected left turn channelization
- installation of traffic signals

- realignment of side street access
- closure of roadways
- construction of new alternative roadways

Safety was a significant consideration in all mitigations explored. The corridor was studied as a signalized operation for all major intersections, as traffic warrants will most likely be met by future traffic volumes for the Year 2020.

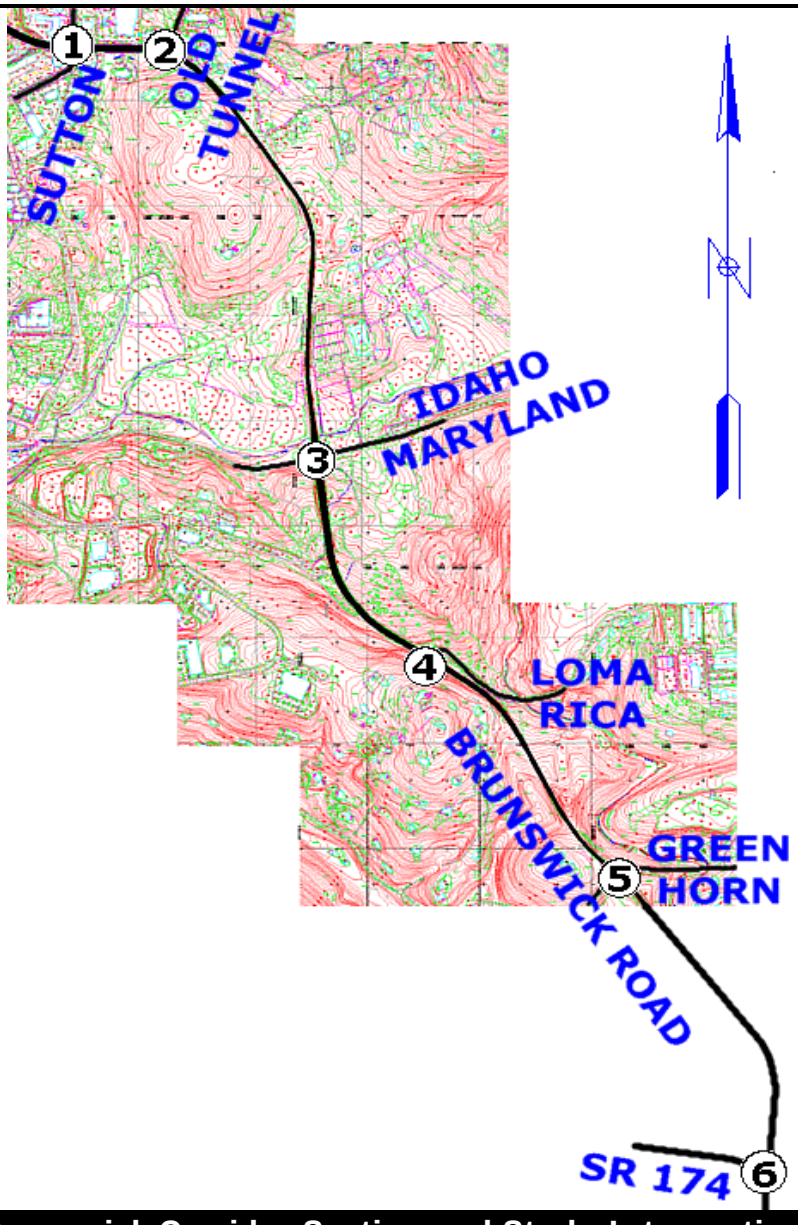

Figure 2 Brunswick Corridor Section and Study Intersections

Analysis

Traffic Model Development And Intersection Analysis

The NCTC's MINUTP model developed for the Empire Interchange Study was utilized and updated by the County with conservative land use assumptions along the Brunswick Corridor (such as the proposed Loma Rica Ranch development, etc.). Traffic projections volumes for the Year 2020 are contained in the appendix of this report. Traffic projections were run and turning movement data provided to the County staff for further processing. County staff analyzed data for study intersections using HCS Highway Capacity Manual software for existing and future conditions. The results of that analysis and mitigation recommendations are summarized in this report.

Turning movements from the future traffic projections using the MINUTP NCTC traffic model were provided to the Nevada County DOT staff for further processing. County staff entered turning movement data into the HCS Highway Capacity Manual software program to determine level of service at each of the study intersections. Using this software as a tool, the level of service for existing and future conditions was determined, as well as what kind of intersection configuration would be needed to achieve a satisfactory level of service rating (LOS D or better conditions).

In the pages that follow, the study intersections and corridor sections shown in Figure 2 are described in detail pertaining to analyses results, improvement scenarios, and cost estimates for existing and future conditions.

Sutton Way Intersection

This intersection currently operates at LOS D/E conditions. One of the existing capacity problems at the intersection is with the left turn pocket on Brunswick Road southbound for traffic entering Sutton Way to the east. This turn pocket is only 250 feet in length, but the pm peak hour traffic volume is 366 vph for existing conditions, and is projected to go to 469 vph in the Year 2020. Figure 3 shows the existing configuration at this location, along with a proposed mitigation.

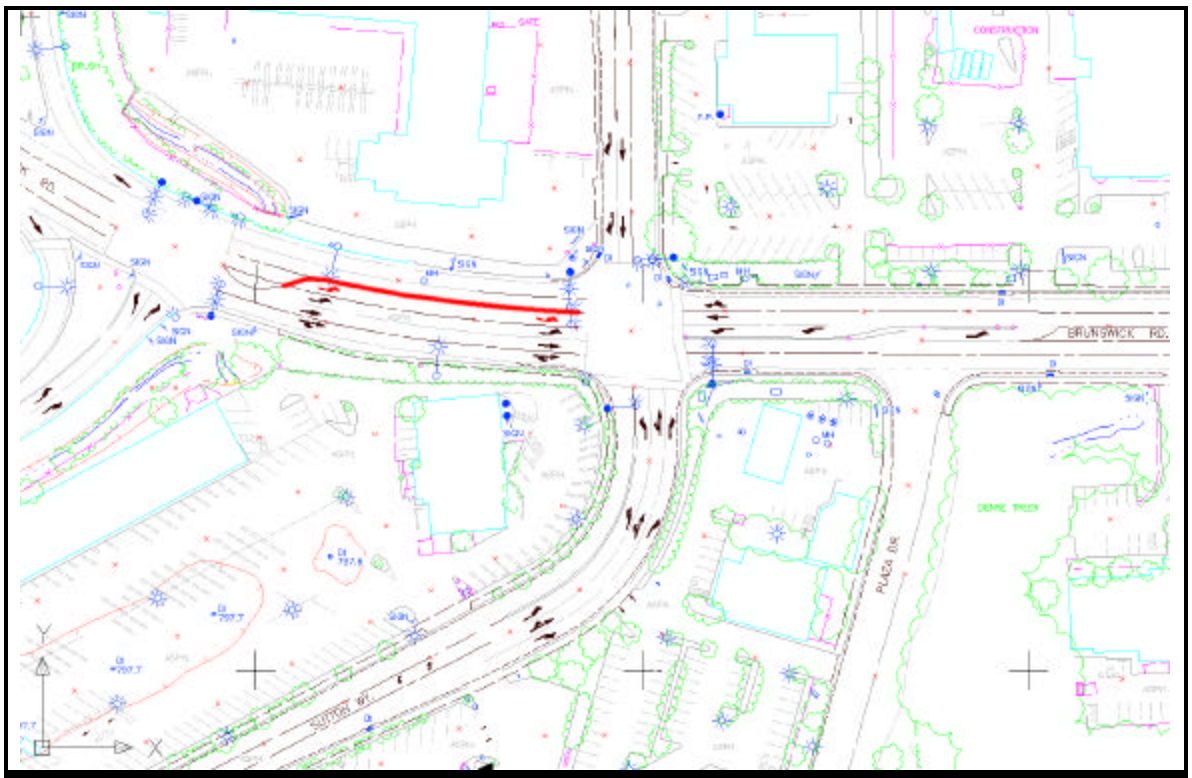

Figure 3 Sutton Way at Brunswick Road

The future Year 2020 traffic volumes are projected to operate at LOS F conditions at this location if no improvements are made, and therefore mitigations will be required. It is possible to mitigate this intersection to operate at LOS D or better conditions in the future if a dual left turn pocket is installed at the location shown in Figure 3.

This left turn pocket can be achieved by restriping Brunswick Road to accommodate it, and with some minor widening to the Brunswick Road cross section. No right of way expansion is anticipated. The only other change that will need to take place is to convert and restripe the northbound section of Brunswick Road between Sutton Way and the

SR 20 eastbound ramp intersection. Currently there are three lanes northbound in this section, one of them being an exclusive onramp lane. The exclusive onramp lane is not necessary and can be converted to operate as the second northbound lane of Brunswick Road. Lane striping for this section would need to be altered somewhat to align traffic flows with the receiving lanes on the Brunswick over-crossing bridge. The NB approach to this intersection may need to have some minor widening on the east side to accommodate a slight shift in the two northbound lanes towards the east (to better align with the receiving lanes on the north side of the intersection. In addition, there would be a need to install additional signal vehicle detection loops for the additional inside SB left turn lane, and a possible need for a longer signal mast arm to accommodate an additional left turn signal head. With these various modifications in place, as well as the effects of construction of the Dorsey Drive interchange (to help reduce some of the future Year 2020 volumes), it is projected that LOS D conditions (average delay of 54 seconds/vehicle) would exist at this intersection.

Cost Estimate: Minor $250k. Cost of paint eradication, restriping, minor widening, signal head realignment, etc.

Old Tunnel / Town Talk Connection

Several concepts for new “cutoff” roadways have been suggested to the NCTC for consideration in this study. One of these that could have merit for future unanticipated development from a traffic circulation standpoint was the New Plaza Cutoff Road shown in Figure 4 below. This new road would connect Plaza Drive with Brunswick Road and tie into Brunswick Road at the Old Tunnel intersection. The cost of this improvement would not be cost effective on its own as a specific mitigation to improve traffic flows for the Brunswick corridor based on current planning assumptions. This new road would have more appropriate application and benefit to local circulation for potential future development, to provide additional capacity off of the Brunswick corridor, and help take traffic away from Sutton Way. Even if this improvement is installed, it will not eliminate the need for other improvements being recommended in this report to the Brunswick corridor, and for this reason this new road is not being recommended in this report as a current planning need. It may be needed in the future, and would be a good idea, to help mitigate impacts for future development in its vicinity. Signalization of this new road with

Brunswick Road in the future would most likely be necessary, should future development ever warrant the new road and the signal, but signal warrant studies should be conducted in future years to verify traffic model assignments and assumptions. The NCTC traffic model was set up to include this connection for an alternative scenario, and the result was that a significant amount of traffic was assigned to use this roadway. It helped to slightly reduce traffic volume demand at the Sutton Way intersection, but does not affect through volumes along the Brunswick corridor. It's most useful function is to provide a "back door" for Sutton Way traffic to get more quickly to Old Tunnel Road as well as to Brunswick Road southbound. There is not enough traffic demand from Brunswick turning left onto Town Talk both now and in the future to warrant any left turn pocket median installation.

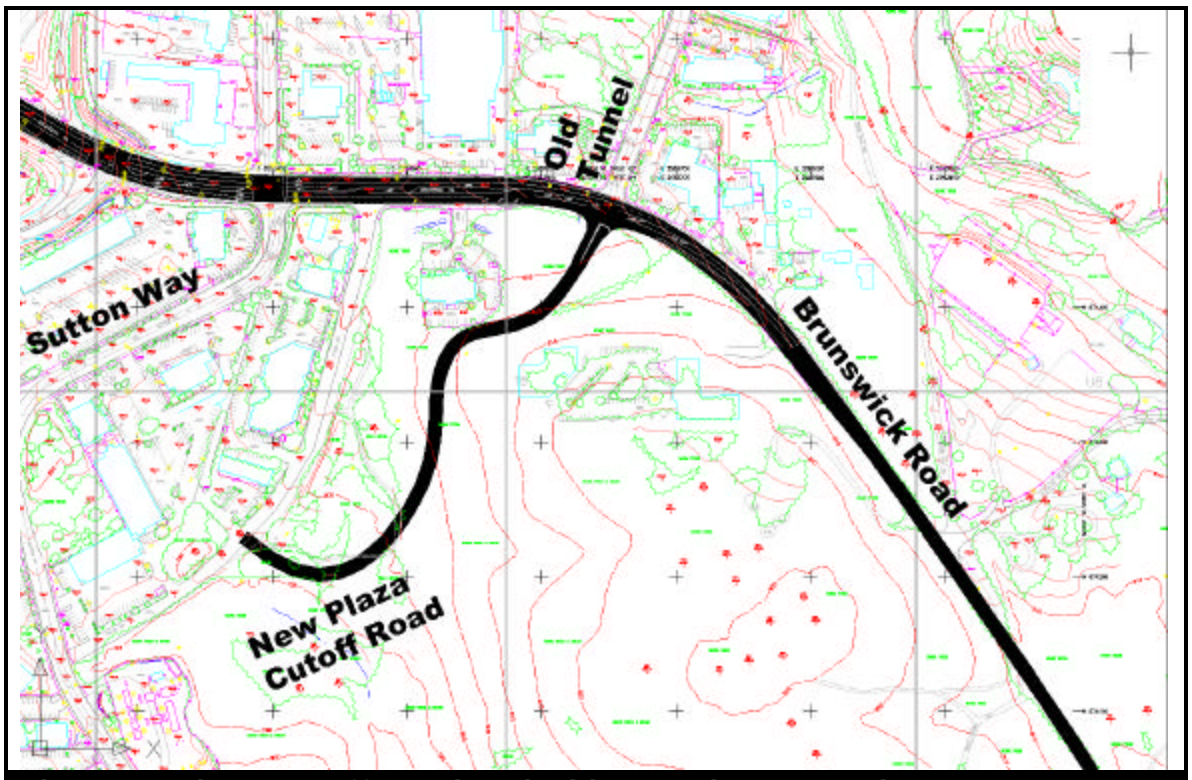

Figure 4 Plaza Cutoff Road and Old Tunnel Intersection

The topography of the two lane alignment shown is reasonable, and the maximum calculated grade for the section is 6% with some moderate cut and fill needed. The cost for this improvement (see Table 1) may be prohibitive given the limited benefit to the regional transportation system. It only provides marginal benefit to the intersection of Sutton Way and Brunswick Road, which can already be mitigated to LOS D conditions without this improvement. It is

recommended that future development incorporate such an alignment into development plans, and that cost be transferred to development.

Table 1.0 – Plaza Drive to Old Tunnel New Roadway Construction Cost Factors and Summary

Construction Activity	Units of Measure	Cost per Unit*	Units in Alternative	Cost Estimate
1. Earthwork Construction				
* Roadway Excavation	Cubic Meter	$13.00	(500m x 8m x 5m x 0.25) 5000 m3	$65k
* Imported Borrow	Cubic Meter	$15.50	N/A	N/A
* Clearing & Grubbing	Lump Sum	$10,000	N/A	$10k
2. Pavement Structural Section				
* Asphalt Concrete (Type A)	Tonn = (m2 x 2 Tonn/m3 x 4in/36in)	$44.00	(500m x 8 m) = 4000 m2 = 889 Tonns	$39k
* Aggregate Base	Cubic Meter	$36.00	1333 m3	$48k
* 25 mm OGAC	Tonn	$46.00	1333 m3	$61k
3. Drainage				
* Storm Drains	Lump Sum	$30,000	N/A	$30k
* Project Drains	Lump Sum	$10,000	N/A	$10k
4. Specialty Items				
* Guardrails, landscaping	Lump Sum	$250,000	N/A	N/A
5. Traffic and Minor Items, Mobilization				
* Signal, signs, etc.	Lump Sum	$200,000	N/A	$200k
6. Roadway Additions				
* Supplemental Work	5% of items 1-5	$(0.05) x (1-5)	$463k	$23k
* Contingencies	25% of items 1-6	$(0.25) x (1-6)	$486k	$122k
7. Structures Items				
* Bridge	surface area sq m	$1350	N/A	N/A
* Under crossing	surface area sq m	$1775	N/A	N/A
8. Right of Way Items				
* Acquisition	Acre	$250,000	1 ac	$250k
* Utility Relocation	Lump Sum	$1000	N/A	$1000
TOTAL				**$859,000**

Cost estimate factors source: Caltrans District 3

Dorsey Drive Extension Connection

The Dorsey Drive extension is a planned improvement, and connects Sutton Way with Brunswick Road with an east/west connector extending from the existing Dorsey Drive corridor. It would actually be part of a much "bigger picture" in a traffic circulation system as shown in Figure 5 below.

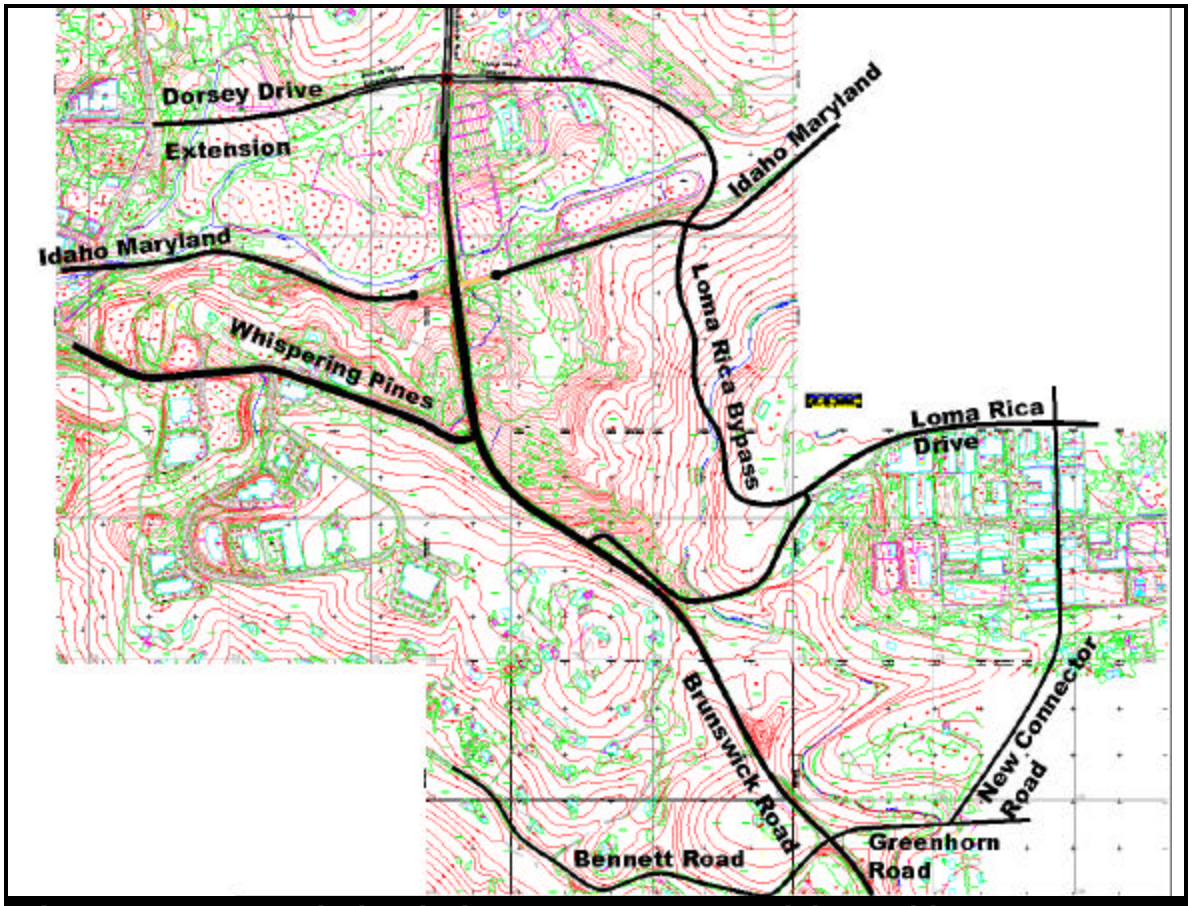

Figure 5 Proposed Circulation System, Brunswick Corridor

The proposed circulation system shown in Figure 5 provides for long term mitigation of negative impacts relating to traffic growth along the Brunswick corridor. Specifically, when the Loma Rica area develops there would be a large volume of traffic turning right to go north on Brunswick Road, and this would create the need for an additional lane on Brunswick Road. The connection to Dorsey Drive and then to the SR 20 Freeway eliminates the need for additional widening on Brunswick Road due to the Loma Rica area future development.

Problems will arise in the future as a side street traffic along the Brunswick corridor is further constrained due to a lack of signals to help side street traffic either cross or gain access to the Brunswick corridor. Two existing intersections in particular which are currently unsignalized include Brunswick Road at Idaho Maryland Road and Brunswick Road at Loma Rica Drive. It is not possible to signalize these two intersections due to steep grade and other safety considerations as previously discussed .

Figure 5 shows that Dorsey Drive would be extended from Sutton Way to an intersection with Brunswick Road, and then continue eastward until its eventual intersection with Idaho Maryland Road. After this intersection, the new roadway would begin a 7% grade going up the hill to the existing Loma Rica Business Park area (road is labeled Loma Rica Bypass on Figure 5). Then this road would transition into the existing alignment of Loma Rica Drive. The existing section of Loma Rica Drive connecting westerly to Brunswick Road would become secondary, and would intersect with the proposed new alignment of Loma Rica Drive in a “T” intersection. This would provide access to Brunswick Road for traffic desiring to go southbound on Brunswick Road.

At a point in time when an additional connector road can be constructed to connect the Loma Rica Business Park with Greenhorn Road, the existing intersection of Loma Rica Drive and Brunswick Road would be relieved because much of the southbound oriented traffic from the Loma Rica Business Park would have a second alternative access.

Cost Estimate: The cost estimate for the extension of Dorsey Drive from Sutton Way to Brunswick Road (a two lane section) is estimated to be $939,000, as calculated in Table 2.

Table 2.0 – Dorsey Drive Extension, Sutton Way to Brunswick

Construction Cost Factors and Summary

Construction Activity	Units of Measure	Cost per Unit*	Units in Alternative	Cost Estimate
1. Earthwork Construction				
* Roadway Excavation	Cubic Meter	$13.00	(200m x 8m x 5m x 0.25) 2000 m3	$26k
* Imported Borrow	Cubic Meter	$15.50	N/A	N/A
* Clearing & Grubbing	Lump Sum	$10,000	N/A	$10k
2. Pavement Structural Section				
* Asphalt Concrete (Type A)	Tonn = (m2 x 2 Tonn/m3 x 4in/36in)	$44.00	(650m x 8 m) = 5200 m2 = 1156 Tonns	$51k
* Aggregate Base	Cubic Meter	$36.00	1733 m3	$62k
* 25 mm OGAC	Tonn	$46.00	1733 m3	$79k
3. Drainage				
* Storm Drains	Lump Sum	$30,000	N/A	$30k
* Project Drains	Lump Sum	$10,000	N/A	$10k
4. Specialty Items				
* Guardrails, landscaping	Lump Sum	$250,000	N/A	N/A
5. Traffic and Minor Items, Mobilization				
* Signal, signs, etc.	Lump Sum	$200,000	N/A	$200k
6. Roadway Additions				
* Supplemental Work	5% of items 1-5	$(0.05) x (1-5)	$468k	$23k
* Contingencies	25% of items 1-6	$(0.25) x (1-6)	$486k	$122k
7. Structures Items				
* Bridge	surface area sq m	$1350	N/A	N/A
* Under crossing	surface area sq m	$1775	N/A	N/A
8. Right of Way Items				
* Acquisition	Acre	$250,000	1.3 ac	$325k
* Utility Relocation	Lump Sum	$1000	N/A	$1000
TOTAL				**$939,000**

Cost estimate factors source: Caltrans District 3

Idaho Maryland Road Cul-de-sac and Realignment

It is recommended that Idaho Maryland Road to the west of Brunswick Road have its connection be terminated and converted into a cul-de-sac. It is also recommended that the east connection of Idaho Maryland Road with Brunswick Road be terminated, and that Idaho Maryland Road be realigned towards a northerly intersection with Brunswick Road as shown on Figure 5 (to meet the Dorsey Drive extension).

The reason for these changes are necessary because of the unique weather and safety challenges along the Brunswick corridor in the vicinity of Idaho Maryland Road. Figure 6 shows the existing condition at this location in a panorama view. The grade of Brunswick Road south of Idaho Maryland Road is steep, and during the winter months snow and ice can be an issue for vehicles desiring to slow down or come to a stop, or to avoid a vehicle crossing Brunswick from Idaho Maryland Road. This is especially critical during peak time periods at the intersection of Brunswick Road and Idaho Maryland Road.

View at 1-90 degrees looking north on Brunswick	*View at 91-180 degrees looking east on Idaho Maryland*	*View at 181-270 degrees looking south on Brunswick*	*View at 271-360 degrees looking west on Idaho Maryland*

Figure 6 Panoramic View (full 360 degrees) of all 4 Intersection Approaches as viewed from the Northwest Quadrant

It is recommended that the future configuration of Brunswick Road not include any of the existing connections to Idaho Maryland Road, but that Idaho Maryland Road be a cul-de-sac on both sides of Brunswick Road, and that Idaho Maryland Road to the east of Brunswick Road be realigned to intersect Brunswick at the same location where Dorsey Drive would be extended east from Sutton Way to intersect with Brunswick Road. This new intersection, a four way intersection, would be signalized and become a significant junction point for east/ --south traffic. This new intersection would also provide the primary access for potential future Loma Rica residential and industrial Business Park developments.

These improvements are safety related in an effort to eliminate the existing and poorly located intersection of Idaho Maryland Road with

the Brunswick corridor. These improvements would take place and coincide at about the same time that the Dorsey Drive freeway interchange is constructed so that Idaho Maryland Road traffic can more easily access to the freeway system.

Cost Estimate: To eradicate striping, and remove pavement immediately adjacent to Brunswick Road, and to cul-de-sac ends of road: $250,000.

Whispering Pines Connection

The intersection of Whispering Pines Lane at Brunswick Road is currently unsignalized with stop sign control for the side street traffic only (Whispering Pines Lane). For the northbound direction Brunswick Road coming down the steep grade there is a left turn pocket for traffic desiring to turn left onto Whispering Pines Lane. There currently is no receiving lane for left turn traffic turning out from whispering Pines lane onto northbound Brunswick Road, and so it is necessary for traffic to cross two directions of traffic and to find gaps in two directions of traffic to get out.

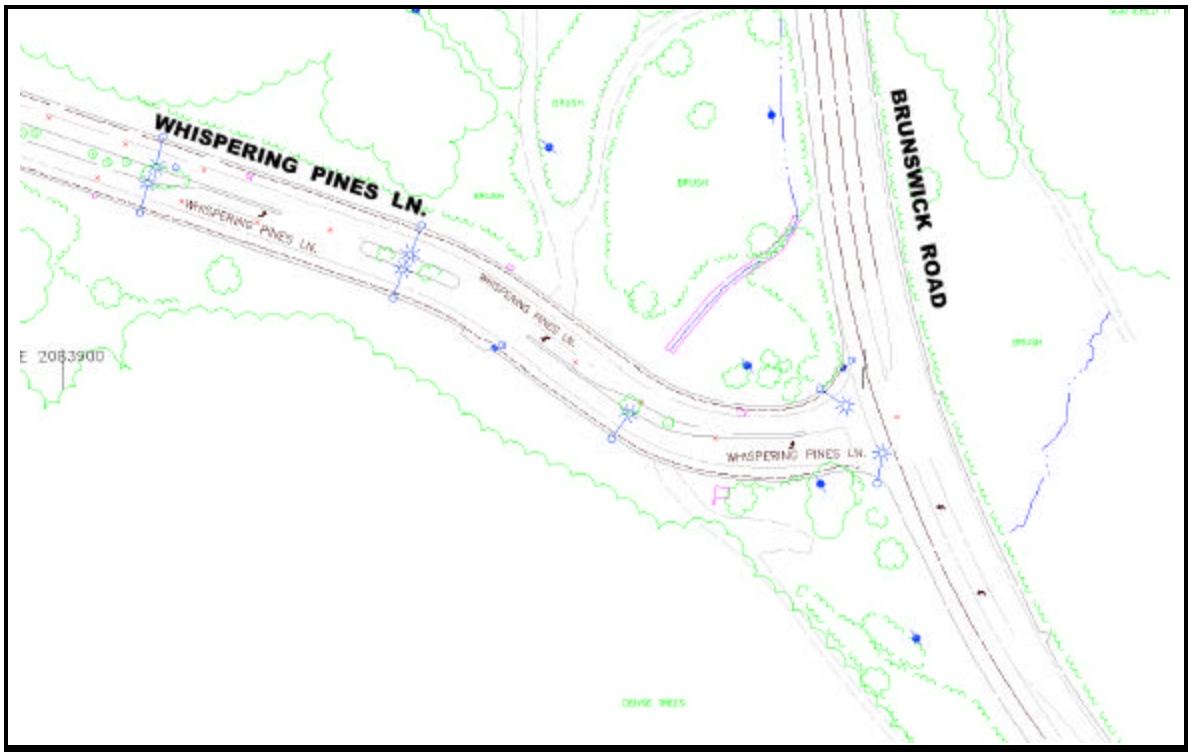

Figure 7 Unsignalized intersection of Whispering Pines at Brunswick

As can be seen from figure 7 there is room in the median to allow a two way left turn lane which would enable easier access on to Brunswick Road for left turns from whispering Pines lane. This mitigation is a simple lane striping modification, and does not require additional right-of-way or pavement widening or changes to the cross section structure of Brunswick Road. It is recommended that the County add a two-way left turn lane immediately north of this intersection to facilitate outbound left turn movements. Cost Estimate: Nominal, cost of paint and County Staff time.

Loma Rica Drive Interim Mitigations (next 10 years)

Figure 5 shows the ultimate configuration circulation system envisioned to help traffic conditions be at an acceptable level of service in the future, but these improvements cannot come on line for a decade or more, or until funding is made available through a capital improvement program. In the meantime it is necessary to provide an interim traffic mitigation for the Loma Rica Drive/Brunswick intersection.

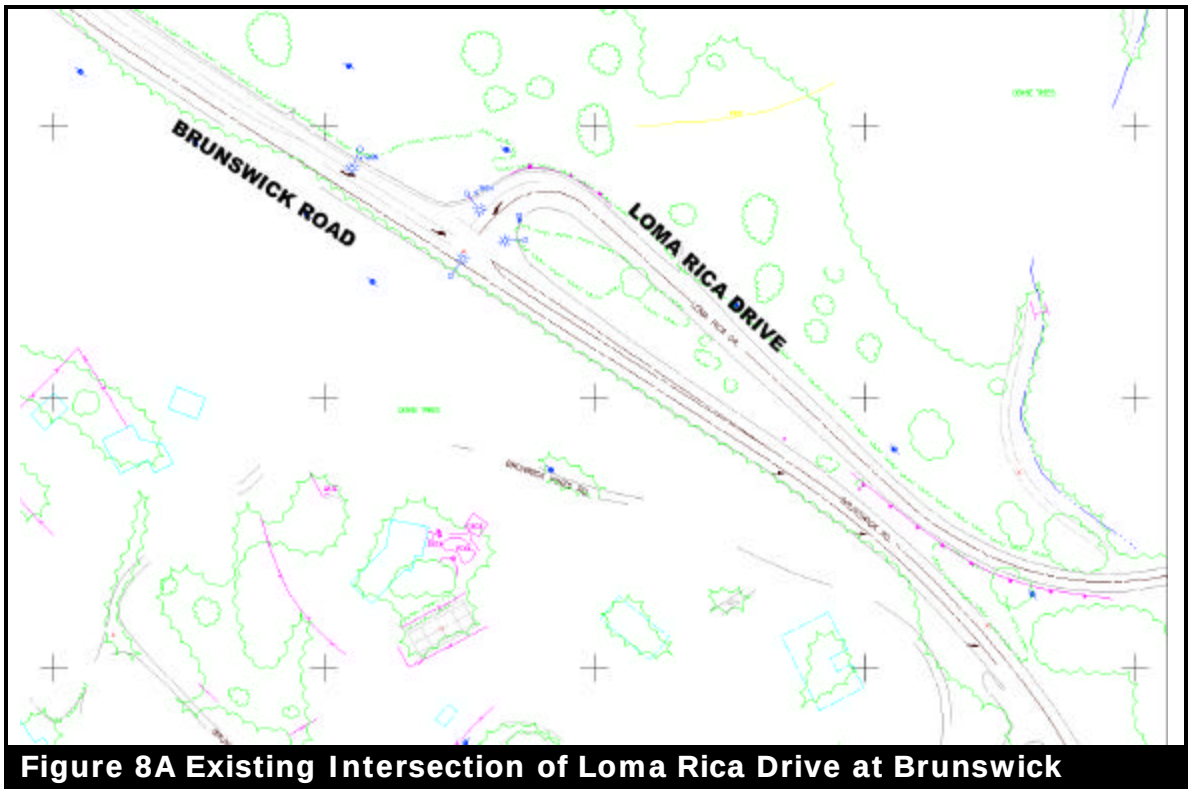

Figure 8A Existing Intersection of Loma Rica Drive at Brunswick

The existing intersection of Loma Rica Drive at Brunswick Road shown in Figure 8A is on a fairly steep hill (7% to 8% grade), and would not be a good candidate for future signalization due to weather and safety

conditions as previously discussed in this report. There would be instances when northbound downhill traffic on Brunswick Road may not be able to adequately stop for a red light signal. Figure 8B shows a panorama photo for this location.

View at 1-60 degrees looking north on Brunswick down steep downgrade	*View at 61-120 degrees looking east to Loma Rica Drive*	*View at 121-180 degrees looking south on Brunswick*

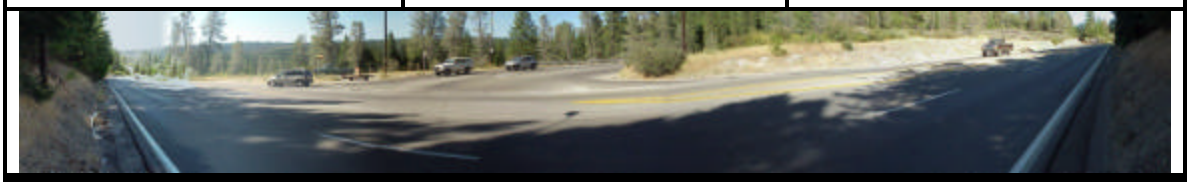

Figure 8B Panoramic View (180 degrees) of all 3 Intersection Approaches as viewed from the west frontage

It is possible to improve traffic operations for this intersection within the existing cross section and street pavement width of Brunswick Road. The demand for the truck climbing lane now extant on the corridor in the southbound direction is no longer needed, or has been significantly reduced with closure of bohemia mill. Converting this lane to a through lane, and converting the existing through lane to the two-way left turn median solves the problem.

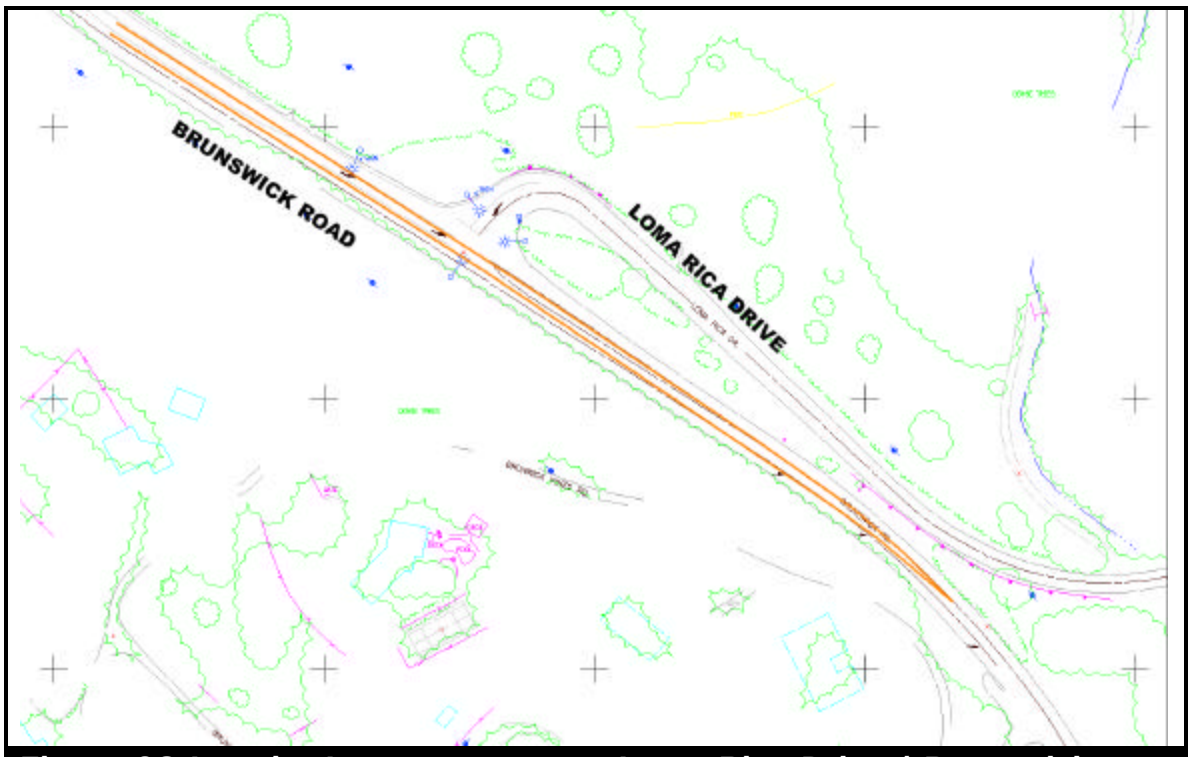

Figure 8C Interim Improvements to Loma Rica Drive / Brunswick

Install Two-Way-Left-Turn lane in median

The interim improvement for this location is shown in Figure 8C. By restriping Brunswick Road it is possible to convert the existing 3 lane cross-section (one lane northbound, two lanes southbound) to have a median configured as a two way left turn lane to the north and south of Loma Rica Drive. This two way left turn lane median would allow left turns into Loma Rica Drive from Brunswick Road southbound directional traffic, and would also easily allow left turn movements from Loma Rica Drive to gain access to southbound Brunswick Road going up the hill. Drivers can utilize the two way left turn lane to accelerate their vehicle and eventually merge into the travel lane of Brunswick Road going up the hill .

This improvement which can be implemented immediately will significantly improve level of service for the side street traffic trying to gain access to Brunswick Road. It is a short-term improvement however, because the Year 2020 traffic volume projections will yield LOS F conditions, even with this improvement. The westbound left turn movement would have a delay of more than eight minutes as an average for each vehicle. It is not possible to further mitigate this LOS F condition for Year 2020 traffic volumes without providing alternative access to the Loma Rica Business Park.

Figure 5 in this report shows the location of two proposed alternative alignments for gaining access in and out of the Loma Rica Business Park. The road labeled new connector road on the graphic would be the facility that could carry additional left turn or southbound oriented traffic out of the Business Park at level of service C or better conditions. The reduction in volumes to the two-way left turn lane due to additional access roads will cause the two-way left turn lane to operate at LOS D or better conditions (could be better, depending on driver awareness of using alternate access roads).

Cost Estimate: The cost estimate for the re-striping of Brunswick Road to accommodate a two way left turn lane is nominal, and can be performed by County staff during normal maintenance of roadways when paint is again needed in the future.

Loma Rica Bypass to Idaho Maryland Road

Access to and from Whispering Pines with Brunswick Road experiences LOS E conditions, and can benefit from traffic using alternative routes

to get to and from the SR 20 freeway corridor. The Dorsey connection helps to achieve this. A Loma Rica Bypass helps to get traffic from the Loma Rica Business Park to the new proposed Dorsey corridor. This significant improvement or alternative access to the Loma Rica Business Park will significantly improve traffic access into and out of industrial and residential areas east of Brunswick Road. This new roadway would have approximately the same grade as the existing Brunswick Road corridor in the vicinity of Loma Rica Drive, which is between 7% and 8% grade. Figure 5 shows the proposed alignment which has been carefully designed to conform to a steady 7.5 percent grade until its intersection with Idaho Maryland Road realigned northward where it begins to flatten out.

The additional of this road will divert a significant amount of traffic from Brunswick Road between Loma Rica Drive and just beyond Idaho Maryland Road, further improving the level of service for traffic along the Brunswick Road corridor in the future. Nearly all of the traffic from the Loma Rica Business Park desiring to go north towards the Brunswick Basin area would use this new road. The future Year 2020 volume of traffic in this direction is nearly 1000 vehicles per hour. The majority of this traffic would use this new roadway facility because of the significantly improved traffic operations and reductions to delay that would take place. This congestion reduction is accomplished by shifting the intersection of this traffic with the Brunswick Road corridor to the north (eventually intersecting at the same location with the Dorsey Drive extension from Sutton Way).

Cost Estimate: The cost estimate for this major and necessary improvement to the circulation system along the Brunswick corridor is shown in Table 3. The total cost to construct this roadway including right of way and contingencies would be 1.8 million dollars. The total length of the new road from its beginning in the Loma Rica Business Park to the intersection with Brunswick Road is approximately 1,700 meters, or approximately one mile.

Table 3.0 – Loma Rica Bypass to Brunswick Road

Construction Cost Factors and Summary (see all Figures)

Construction Activity	Units of Measure	Cost per Unit*	Units in Alternative	Cost Estimate
1. Earthwork Construction				
* Roadway Excavation	Cubic Meter	$13.00	(800m x 8m x 5m x 0.25) 8000 m3	$104k
* Imported Borrow	Cubic Meter	$15.50	N/A	N/A
* Clearing & Grubbing	Lump Sum	$10,000	N/A	$10k
2. Pavement Structural Section				
* Asphalt Concrete (Type A)	Tonn = (m2 x 2 Tonn/m3 x 4in/36in)	$44.00	(1700m x 8 m) = 13600m2 = 3022 Tonns	$133k
* Aggregate Base	Cubic Meter	$36.00	4533 m3	$163k
* 25 mm OGAC	Tonn	$46.00	4533 m3	$209k
3. Drainage				
* Storm Drains	Lump Sum	$30,000	N/A	$30k
* Project Drains	Lump Sum	$10,000	N/A	$10k
4. Traffic and Minor Items, Mobilization				
* Delineation, signs, etc.	Lump Sum	$100,000	N/A	$100k
5. Roadway Additions				
* Supplemental Work	5% of items 1-5	$(0.05) x (1-5)	$759k	$38k
* Contingencies	25% of items 1-6	$(0.25) x (1-6)	$797k	$199k
6. Right of Way Items				
* Acquisition	Acre	$250,000	3 ac	$750k
* Utility Relocation	Lump Sum	$1000	N/A	$1000
TOTAL				**$1,747,000 say, $1.8 Million**

Cost estimate factors source: Caltrans District 3

Loma Rica Business Park Southerly Connection to Greenhorn Road

This connector is fairly easy to construct as there is a direct line on smooth topography between Greenhorn Road and the Loma Rica Business Park as shown in Figure 5. The amount of traffic that would use this new connector is approximately 3000 vehicles per day. This is

only one example of several possible concepts that may work for helping to relieve traffic impacts from the Loma Rica Business Park in the future.

A preliminary cost estimate has been prepared and is shown in Table 4 below.

Table 4.0 – Loma Rica Connector to Greenhorn Road
Construction Cost Factors and Summary (see all Figures)

Construction Activity	Units of Measure	Cost per Unit*	Units in Alternative	Cost Estimate
1. Earthwork Construction				
* Clearing & Grubbing	Lump Sum	$10,000	N/A	$10k
2. Pavement Structural Section				
* Asphalt Concrete (Type A)	Tonn = (m2 x 2 Tonn/m3 x 4in/36in)	$44.00	(700m x 8 m) = 5600m2 = 1244 Tonns	$55k
* Aggregate Base	Cubic Meter	$36.00	1867 m3	$67k
* 25 mm OGAC	Tonn	$46.00	1867 m3	$86k
3. Drainage				
* Storm Drains	Lump Sum	$30,000	N/A	$30k
* Project Drains	Lump Sum	$10,000	N/A	$10k
4. Roadway Additions				
* Supplemental Work	5% of items 1-5	$(0.05) x (1-5)	$258k	$13k
* Contingencies	25% of items 1-6	$(0.25) x (1-6)	$271k	$68k
5. Right of Way Items				
* Acquisition	Acre	$250,000	1.2 ac	$300k
* Utility Relocation	Lump Sum	$1000	N/A	$1000
TOTAL				**$640,000**

Cost estimate factors source: Caltrans District 3

It is recommended that this mitigation be studied more in the future to determine a precise alignment and feasibility of constructing this improvement near existing homes in the area. In addition, the specific geometry for roadway intersections needs to be developed in conjunction with future study. Neighborhood meetings need to be held to discuss the potential impacts. However, from a strict traffic engineering standpoint on traffic circulation, this improvement would be recommended. A EIR is probably necessary.

Brunswick and Greenhorn Road

This intersection currently operates at LOS C conditions, and it an All-Way Stop sign controlled intersection. The All-Way Stop condition is currently needed because a signal will be warranted in the near future, and side street traffic levels are nearly high enough to warrant interruption of continuous traffic.

Figure 9A shows the existing intersection configuration for this location. As can be seen from the figure, there are left turn pockets on Brunswick Road for both directions, but the side streets of Greenhorn Road and Bennett Road are single lane approaches. Figure 9B shows a panoramic view of the intersection from the northeast quadrant.

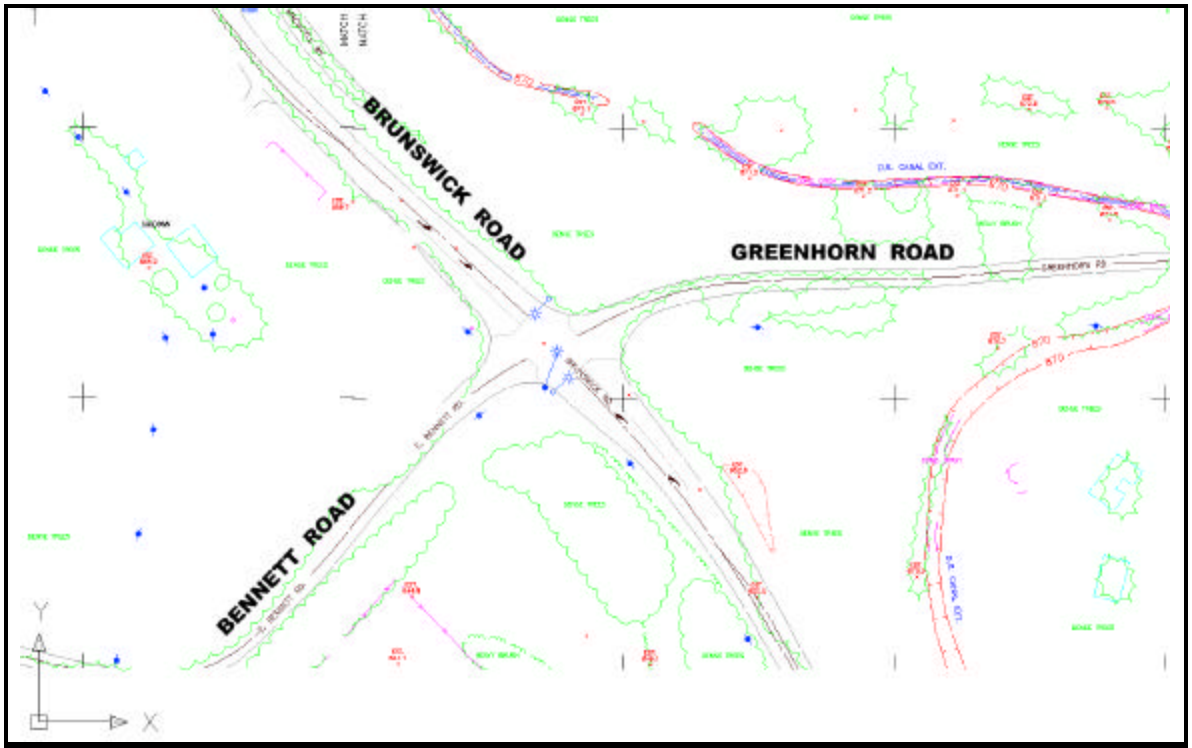

Figure 9A Intersection of Brunswick Road and Greenhorn Road

View at 1-90 degrees looking east on Greenhorn	*View at 91-180 degrees looking south on Brunswick*	*View at 181-270 degrees looking west on Bennett*	*View at 271-360 degrees looking north on Brunswick*

Figure 9B Panoramic View (full 360 degrees) of all 4 Intersection Approaches as viewed from the Northeast Quadrant

In the future, this location will go to LOS F conditions due to the increase in traffic and the stop sign control, which can't adequately handle the traffic operations. A signal installation is necessary to mitigate traffic conditions to LOS D or better. It is recommended that a traffic signal be installed at this location in the future when traffic signal warrants are met. Traffic signal warrants are anticipated to be fully met by the Year 2005.

There is no need to widen the roads or alter the lane striping at this location in the future, as a signal installation is the complete mitigation using the existing lane geometry.

Cost Estimate: $150,000 for four-way signal.

Brunswick and State Route 174

This intersection was analyzed for the existing conditions and found to be at LOS C conditions. The existing intersection control is stop sign control for the side street only (Brunswick Road); there is a free-right turn lane for Brunswick to SR 174, and a left turn pocket with stop sign control. There is a two-way left turn lane on SR 174 to the south of the intersection. SR 174 is free flow and unimpeded by and traffic control. Figure 10A shows the existing intersection edge of pavement at this location. Two lane approaches in each direction. Left from 174 to Brunswick, left from Brunswick to 174 and free right from 174 to Brunswick (from Colfax). In the future Year 2020 scenario, conditions worsened to LOS E conditions. With the addition of a signal at this location, LOS B conditions would prevail with Year 2020 traffic projections. It is recommended that a signal be installed at this location in the future at such time that signal warrants are met. Figure 10B shows a panoramic view of the intersection as viewed from the east frontage area.

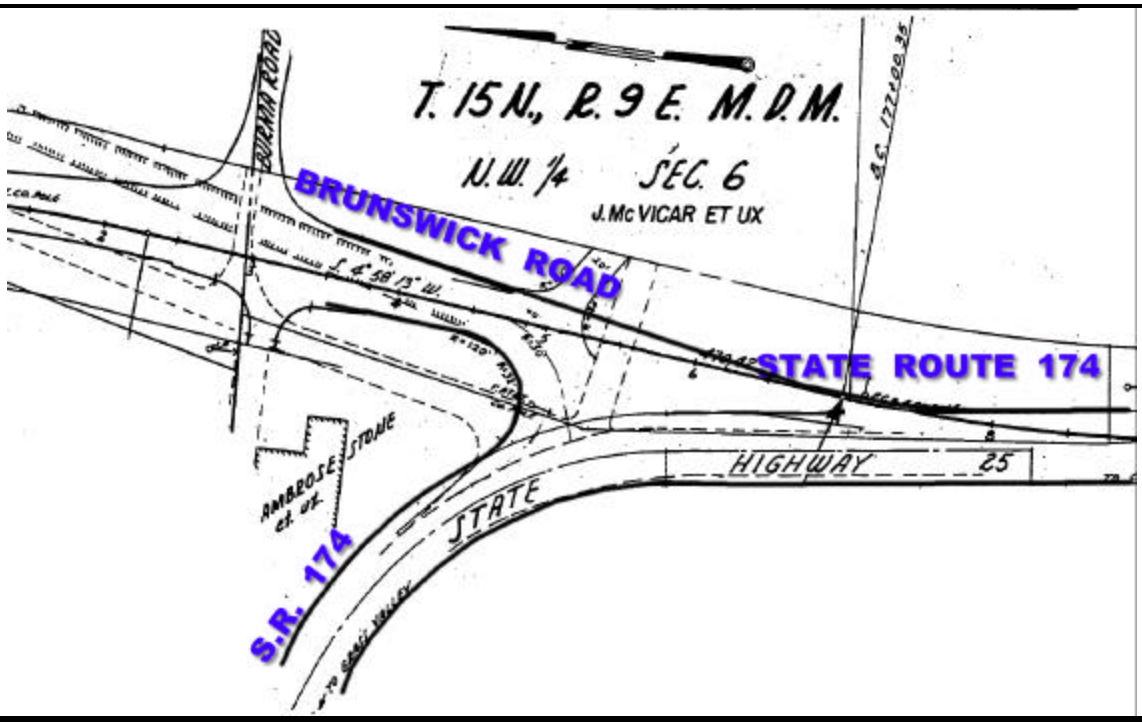

Figure 10A Intersection of Brunswick Road and SR 174

View at 1-90 degrees	*View at 91-180 degrees*	*View at 181-270 degrees*	*View at 271-360 degrees*

Figure 10B Panoramic View (full 360 degrees) of all 3 Intersection Approaches as viewed from the East Frontage Area

Cost Estimate: $150,000 for 3-way signal.

APPENDIX

Existing and Projected Traffic Volumes

Existing Traffic Volumes:

Cross Street	NB			SB			EB			WB		
	L	T	R	L	T	R	L	T	R	L	T	R
Sutton Way	191	619	17	366	544	367	473	79	105	293	79	205
Old Tunnel	0	518	54	0	198	467	0	0	0	57	0	138
Idaho Maryland	184	547	35	54	473	14	4	31	124	27	24	24
Whispering Pines	22	677	0	0	635	23	83	0	60	0	0	0
Loma Rica	0	355	24	117	551	0	0	0	0	88	0	352
Greenhorn/E. Bennett	4	281	34	120	481	32	18	32	8	16	28	64
SR 174	0	0	0	385	0	137	83	221	0	0	191	216

2020 Traffic Volumes (Without Dorsey Interchange)

Cross Street	NB			SB			EB			WB		
	L	T	R	L	T	R	L	T	R	L	T	R
Sutton Way	306	850	27	436	845	384	525	92	195	402	91	400
Old Tunnel	0	709	86	317	681	0	0	0	0	160	0	221
Idaho Maryland	294	875	172	86	710	22	11	10	198	100	70	154
Whispering Pines	56	1154	0	0	1073	51	95	0	102	0	0	0
Loma Rica	0	589	38	226	945	0	0	0	0	166	0	621
Greenhorn/Bennett	15	416	77	187	767	124	117	45	42	30	30	97
SR 174	0	0	0	581	0	233	123	282	0	0	296	346

2020 Traffic Volumes (With Dorsey Interchange)

Cross Street	NB			SB			EB			WB		
	L	T	R	L	T	R	L	T	R	L	T	R
Sutton Way	96	600	27	469	717	217	452	51	45	368	58	430
Old Tunnel	0	518	65	294	460	0	0	0	0	126	0	218
Dorsey Extension	440	640	88	121	568	46	28	195	396	83	213	140
Whispering Pines	56	1154	0	0	1073	51	95	0	102	0	0	0
Loma Rica	0	570	36	215	950	0	0	0	0	198	0	592
Greenhorn/Bennett	28	374	55	221	701	76	70	64	57	29	39	89
SR 174	0	0	0	565	0	242	128	277	0	0	285	360

2020 Traffic Volumes at Dorsey Extension w/Northerly Loma Rica Bypass

	NB			SB			EB			WB		
	L	T	R	L	T	R	L	T	R	L	T	R
Dorsey Extension	96	600	27	336	363	46	28	195	396	83	58	430

2020 Traffic Volumes at Greenhorn/E. Bennett w/Southerly Loma Rica Bypass

Greenhorn/Bennett	28	374	55	221	503	76	70	64	57	227	39	89